Physics AS & A Level | Edexcel | 89H0/9PH0

Topic Tests

for AS/A Level Year 1 Edexcel Physics
Sections 1–5

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POD 7263

Contents

Teacher's Introduction

These topic tests have been designed to help you and your students assess their knowledge of a topic after you have taught each section of **AS and A Level Year 1 Edexcel Physics Sections 1 to 5.**

Each topic test closely follows the content of the specification and includes:

- **Factual questions**: Some simpler factual questions are included to ensure that all the content and basics are covered, and to allow weaker learners access to some marks.
- **Short-answer questions**: These are not in exam style, and the purpose of these is to test different elements, knowledge and skills from the specification in a variety of styles.
- **Exam-style questions**: Where appropriate, topics may contain one or more exam-style questions, to prepare students for what they might meet in the exam, and to test exam skills.

Mathematical skills are also covered in these topic tests.

Tests have been designed to take approximately 25–60 minutes and are worth between 30 and 43 marks. The varying marks for each test reflect the content level coverage in each. Please note that some topic sections have been combined, as shown in the table:

Topic Test	Topic Number	Number of Marks
1	1	43
2	2	40
3	2	34
4	2	30
5	2	30
6	3	39
7	3	38
8	4	37
9	5	39
10	5	39
11	5	38

The topic tests are suitable for a classroom assessment, revision aid or homework task and are, therefore, suitable for use immediately after a topic is completed in class or at the end of teaching the course.

Students are able to see the number of marks awarded for each question, allowing them to gauge the level of detail they will require for the answers, as in exam conditions. Full answers with marks are included at the end of the resource. Additionally, this makes the resource a suitable tool for students to use independently.

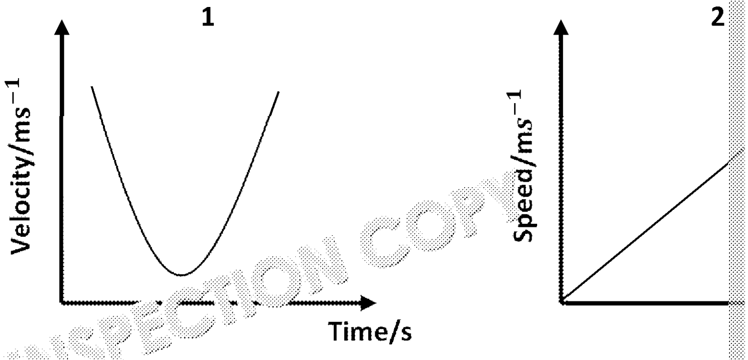
It is recommended that students have access to a calculator to complete the questions. Students may also need a sheet containing Physics data and formulae, which can be found on the exam board website.

I hope you find these tests useful during your teaching.

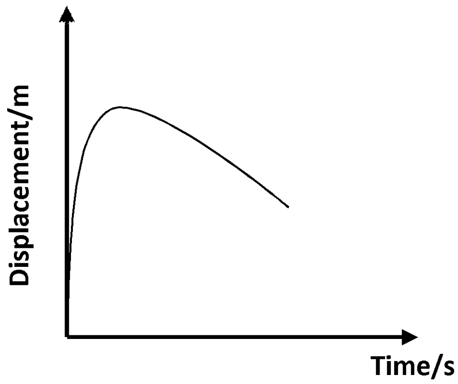
Topic Test 2: Motion in a Straight Line and Project

1. Indicate which graph could be used to calculate the following quantities. Giv

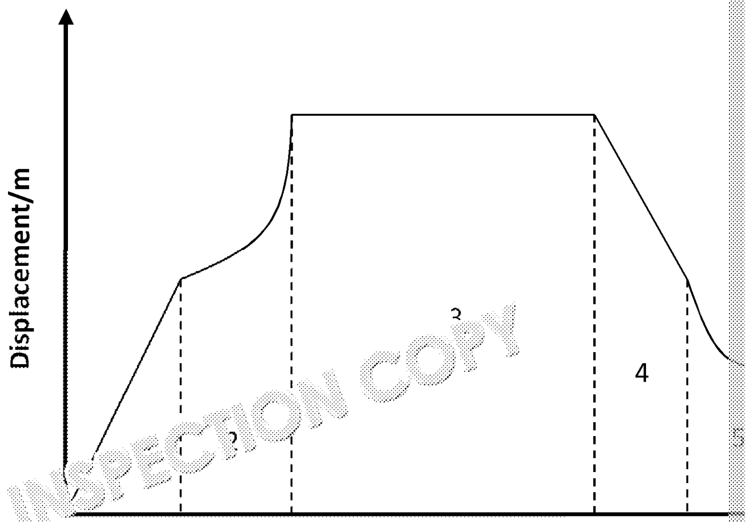
   a) Acceleration
   b) Distance



   c) Ex ow you could calculate velocity from the following displaceme



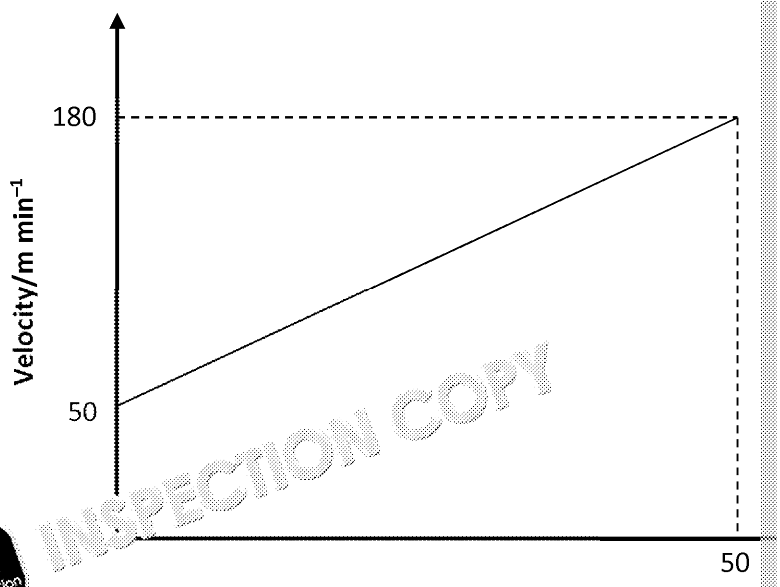
2. The motion of a rally car was recorded during its race and the following displa



   a) Describe the car's motion at:
      - Stage 1
      - Stage 3
      - Stage 4

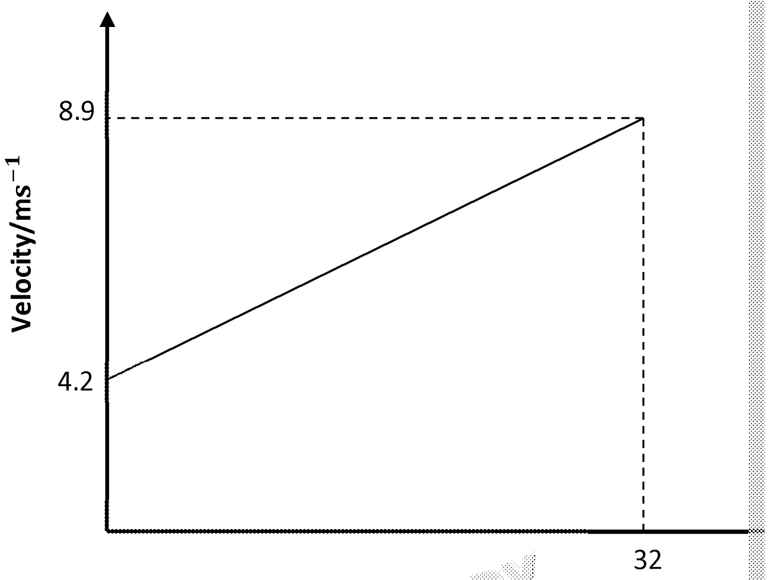
   b) Sketch a velocity–time graph for stage 2 of the car's journey.

3. A runner records his motion during the first section of a marathon.



Calculate the runner's displacement during the first 50 minutes of the mara

4. The transport department of the local council has been recording the motio local primary and secondary schools to understand whether safe road practi one vehicle is described in the velocity–time graph.



Explain how the department could u[illegible]r [illegible]wledge of the equation of a $y = mx + c$, to determine th[illegible] initial velocity and acceleration.

5. A plane [illegible] ve[illegible] [illegible]ng a runway at 12 m s^{-1}. The plane takes off 30 s late the pla[illegible] celeration over this period?

6. A running group is out on a weekly run in their local park. During the final st her shoelaces. Runner 2 approaches Runner 1 at a running velocity of 2.0 m velocity. Runner 1 starts from rest, as Runner 2 passes, and accelerates at 1.

   a) Calculate what time the runners will be side by side again.
   b) Determine the velocity at which Runner 2 would have needed to be ru for the two runners to be side by side again after 3 seconds.

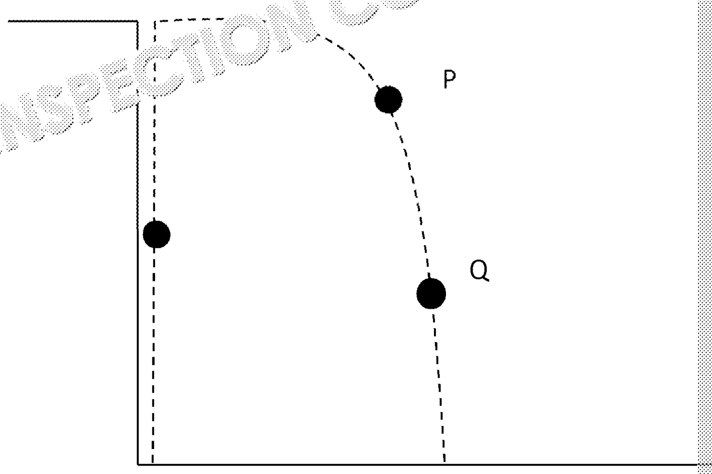
7. A child is playing with a toy rocket in their back garden. The rocket is launch… the rocket straight into the air from its launch pad. The rocket is released at … negligible.

a) What will the rocket's velocity be when it reaches its maximum height?

The garden has a fence around it that stands 2 metres high.

b) Show by calculation whether the rocket will reach the height of the fen…

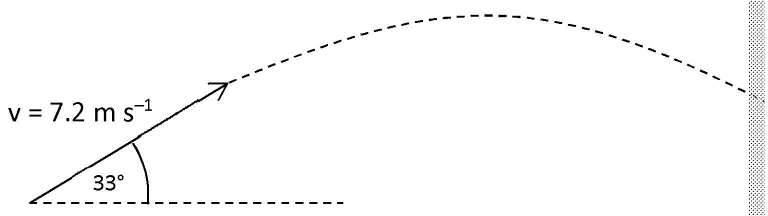
8. Two identical objects are dropped from an identical height. Object 1 is dropp… thrown horizontally. The diagram indicates the motion of each object. Ignor… assume the objects do not reach terminal velocity b… hitting the ground.



Object 1 **Object 2**

a) State which object is displaying projectile motion.
b) State which velocity component will be affected by acceleration.
c) Draw the ball's vertical and horizontal velocity components at:
   - P
   - Q

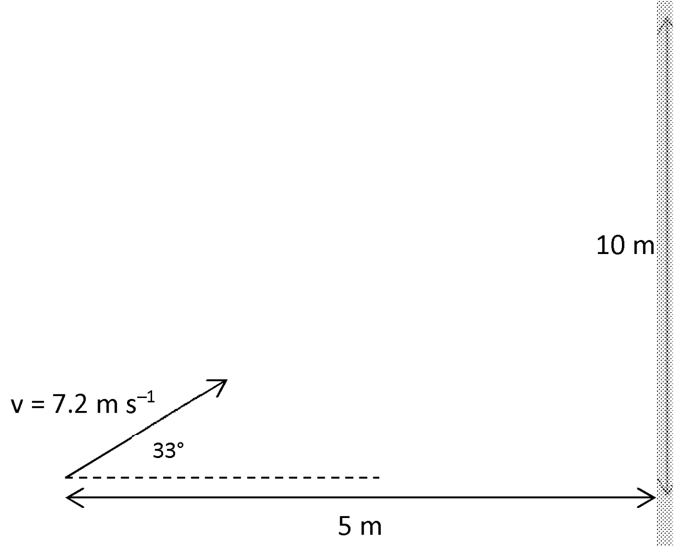
9. Chris regularly practises his cricket batting in his back garden. One of his bat
cricket ball being launched at 7.2 m s^{-1} at 33°.



a) Resolve the velocity vector into its horizontal and vertical components.

b) Calculate the velocity vector's horizontal and vertical components.

Chris repeatedly gets into trouble with his neighbours when the cricket ball l
stop this from happening Chris builds a fence between his garden and his ne
at 10 m and is placed 5 m from where he stands to bat.



c) Does the fence stop the ball reaching Chris's neighbour's garden?

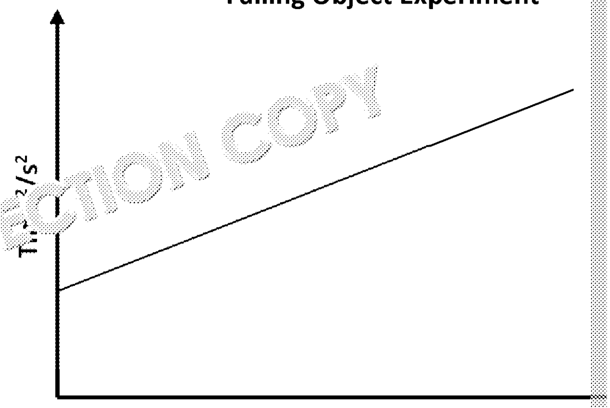
10. A group of Year 12 physicists carry out an experiment to determine the accel

The experimental method involves dropping a steel ball initially at rest from used to measure how long it takes for the steel ball to fall through the heigh experimental method once.

The students plot a graph of t^2 against h, similar to the graph below. They u $s = ut + ½gt^2$ to calculate g.

Ignore the effects of air resistance.

Falling Object Experiment



a) Explain how you could use the graph to calculate the acceleration due t
Hint: *Compare* $s = ut + ½gt^2$ *to equation for a straight line.*

b) Suggest one limitation of the experiment.

Preview of Questions Ends Here

Answers

Topic Test 1: Measurements and Their Errors

1. ms^{-2} (1)

2. Incorrect:
   C Energy (1); should be joules (1)
   D Force (1); should be newtons (1)

3. a) 0.05 A (1)
   b) 0.0001 s (1)
   c) 0.0252 kg (1)
   d) 700 m (1)

4. ½ for each correct answer.

Base Quantity	
Mass	
Length	
Temperature	
Current	
Quantity of Matter	
Time	

5. a) 70–80 kg (1)
   ii) $E = mgh$
   E = (60 to 90) × 10 × 5
   E = 3000 to 4500 J (1)
   Accept any answer for energy that falls in between these two value
   b) i) The gravitational potential energy of the second friend at the end of th
   ii) $E = mgh$
   E = (80 to 90) × 10 × 5
   E = 4000-4500 J (1)
   E = 4 kJ–4.5 kJ (1)
   Accept any answer that falls in between these two values.

6. a) pm; nm; μm; mm (1)
   b) kV; MV; GV; TV (1)
   c) cm; dm (1)

7. Random *error*: refers to a measurement error that causes repeated measurem one another and results in a spread of measured values around a true value. (The error is random and as a result of sources that cannot be foreseen. (1)

8. B (1)

9. Give full marks (1) for identification of any one of the possible answers:
   - Repeating the experiment (1)
   - Taking the mean of measured values (1)
   - Identifying the anomalies (1)

10. D (1)

11. a)
- High accuracy due to each shot hitting the target centre (true value).
- High precision due to all the shots being in extremely close proxim[...]
  OR
- High precision due to the shots recorded having a small spread. (1)

b) If each shot became less accurate then each shot would be recorded furt[...] (true value). (1)

c)
- High precision due to shots recorded in close proximity to each oth[...]
  OR
  High precision due to the shots recorded having a small spread. (1)
- Low accuracy due to each of the shots being recorded a significant [...] (true value). (1)

d) If the shots recorded became less precise it would [...]ult in increase in th[...] (increase the distances between each of t[...]). (1)

12. a) 0.1 cm (1)

b) percentage un[...] $= \frac{[...]}{26.4} \times 100 = 0.4\%$ (1)

c) T[...] fo[...] [det]ermining the uncertainty in a measurement that is deter[...] m[...]nent is:

If $C = B^n$; $B \pm b$

Then $C = (B)^n \pm (nb)$

Therefore:

$A = \pi r^2$

$A = \pi \times (3)^2 = 28.3\ \text{cm}^2$ (1)

% uncertainty in A = 2 × % uncertainty in r (1)

% uncertainty in r $= \frac{0.1}{3} \times 100 = 3.3\%$

% uncertainty in A = (2 × 3.3) = 6.7%

Absolute uncertainty in A; $\Delta a = \frac{6.7}{100} \times 28.3 = \pm 1.9\ \text{cm}^2$ (1)

13. a) Gradient of best line fit $= \frac{1.95-0.15}{8-0} = 0.23$ (1)

b) uncertainty = |gradient of line of best fit − gradient of line of worst fit| (1)
uncertainty = |0.23 − 0.29| = 0.06 (1)

c) percentage uncertainty $= \frac{\text{uncertainty}}{\text{gradient of best fit line}} \times 100$ (1)
percentage uncertainty $= \frac{0.06}{0.23} \times 100$
percentage uncertainty = 26% (1)

d) The ammeter should display a zero measurement (no charge) when the[...] the plates; therefore, the source of the error will be a false reading for ze[...]

Preview of Answers Ends Here